embodiment in view of a process for forming the interlayer insulation film 3. An outline of the process is given below (steps 1 to 5).

Step 1: A vanish is applied on a semiconductor substrate by using a spin coating technique.

Step 2: A heat treatment 80℃, one minute is applied to the substrate.

Step 3: A heat treatment 200℃, one minute is applied to the substrate.

Step 4: An electron beam is irradiated on the semiconductor substrate 1 while the semiconductor substrate 1 is heated in a reduced pressure nitrogen atmosphere, and the interlayer insulation film 3 is formed.

Step 5: A heat treatment 400℃, about two minutes is applied to the semiconductor substrate 1.

The above process will be described in detail. First, as in the first embodiment, the steps 1 to 3 are executed.

Then, while the nitrogen gas is introduced into the reaction chamber about 20 slm, the semiconductor substrate 1 is placed on the hot plate held at 400℃ in the reduced pressure nitrogen atmosphere, a coat film is irradiated with the electron beam, and the interlayer insulation film 3 (polymethyl siloxane film) is formed (step 4).

In the present embodiment, during the electron

beam irradiation at step 4, the pressure in the reactor chamber is changed to 10 Torr and 60 Torr. That is, the electron beam irradiation is carried out by setting the pressure in the reactor chamber to 10 Torr and setting the irradiation quantity to about 5 $\mu C/cm^2 \cdot sec$ for about 180 seconds from the start of electron beam irradiation. Then, the electron beam irradiation is carried out by setting the pressure in the reactor chamber to 60 Torr and setting the irradiation quantity to about 4 $\mu C/cm^2 \cdot sec$ for about 30 seconds until the end of the subsequent electron beam irradiation.

In addition, in order to maintain the uniformity of electron beam irradiation under the above condition, a hot plate is placed at a position of 75 mm from the lower end of the electron beam generating section, and the electron beam irradiation is carried out in the present embodiment.

Further, the semiconductor substrate 1 is placed on a hot plate maintained at 400℃ in the same reactor container used it the step 4, heat treatment is carried out for about 2 minutes, and the interlayer insulation film 3 is formed (step 5).

In the step S5, for about 30 seconds from the start of treatment, the hot plate is placed at a position 75 mm from the lower end of the electron beam generating section, and the heat treatment is carried out. For about the subsequent 1.5 minutes, the hot

plate is placed at a position 120 mm from at the lower end of the electron beam generating section, and treatment is carried out.

Further, it is desirable to set the substrate temperature to 200℃ or more, and not more than 500℃ in the heat treatment of the step 4 by virtue of a reason similar to that stated in the step 4 of the first embodiment.

In addition, the heat treatment temperature in the step 5 is effective when the temperature is equal to or higher than that of the step 4. Further, the treatment time is effective when the time is equal to or longer than that at the step 4.

As the reasons similar to those at the step 4 of the first embodiment, it is desirable that the steps 4 and 5 are executed in reduced pressure atmosphere in which an oxygen concentration is reduced to 100 ppm or less.

With respect to characteristics of the polymethylsiloxane film formed by the process of the present embodiment, advantageous effect similar to that shown in the first embodiment is obtained.

Further, by the heat treatment process at the step 5, a damage caused in a gate insulation film of a semiconductor element can be removed by the electron beam irradiation, and characteristics such as leak current or threshold voltage of a semiconductor device